

PROJECT NUMBER: 2307
PROJECT TITLE: Flavor Investigation/Nonvolatile Flavor
Investigation/Processed Tobacco
PROJECT LEADER: W. R. Raymond
PERIOD COVERED: July, 1987

I. FLAVOR INVESTIGATION

A. Objective: To provide analytical support for activities related to development and application of flavoring materials.

B. Results:

1. Analytical Support: Nine compounded flavors and fruit extract concentrates have been analyzed for water, solvents, sugars and volatile composition. Twenty three flavor house essential oil submissions have been characterized by GC and GC-MS. A complete volatile composition comparison by GC and GC-MS is in progress for seven folded mandarin oils (4X to 10X). Several flavor chemicals have been assayed for purity and impurity identification.

Three A/C flavors and components for Project "Trim" were characterized by GC. Anethole analyses were performed on control (MS) and test (MS-PG) A/C's for B&H and Marlboro POL testing. All were within specifications.

2. Project "ART": Two samples of extractor residues, one dissolved in ethanol and the other in PG, were fractionated by silica gel chromatography and analyzed by GC and GC-MS. The samples appeared to be mixtures of long-chain hydrocarbon waxes, fatty acids, fatty acid esters and tobacco flavor compounds (mega stigmatrienones and probably thumberganoids, etc.).
3. Tonka Bean: Subfractionation and analytical characterization of major fractions continued. Monadic subjective testing on uncased Marlboro Lights blanks is in progress to select fractions for further evaluation and establish application windows.
4. Nontobacco Materials: Several samples of packaging materials, including new graphics samples of B&H labels and "Blue" labels from "Alford", were analyzed by headspace GC for residual ink solvents. "Golden Belt" foil, suspected of having an off-odor, was compared by GC to an acceptable control and found to be analytically no different.
5. Applied Flavor Investigation: A study was begun of the adsorptive properties of Ambersorb XW-340 and XE-348 using headspace-GC techniques. The objective is to test feasibility of flavor release systems based on these adsorbants.

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II. NONVOLATILE FLAVOR INVESTIGATION

A. **Objective:** To investigate tobacco-natural, tobacco-identical and other nonvolatile fractions and constituents for potential application as cigarette flavor additives.

B. **Results:**

Initial size-exclusion (S.E.) experiments resulted in separation of Bright tobacco extract into three major fractions. Total nicotine content in the three fractions was determined by GC to be <2% of that present in the starting extract indicating adsorptive retardation by the S.E. medium. Fractionation will continue. Fractions will be assayed for glycoside content and evaluated subjectively.

III. PROCESSED TOBACCO

A. **Objective:** To develop basic and applied knowledge for the purpose of improvement or selective modification of subjective properties of processed tobaccos.

B. **Results:**

1. POL's of humectant rearrangement in Marlboro, Marlboro Lights and B&H Menthol have been subjectively screened and released.
2. Repeat POL's of SHIS versus ES in Marlboro have been extended to include a casing modification. Awaiting stem from LVL. SHCRS to be evaluated for substitution in PMI.
3. POL 3536 (Park 500 RL evaporator test) was released. A remake of POL 3535 cigarettes has been requested due to unacceptable subjectives in both control and test.
4. Internal subjective results showed differences for preservative added to flavor solution in RCB. Further testing recommended to determine potential interactions.
5. Cigarettes for POL's 3548 and 3549 (dry flavor replacements in RLB and RCB) scheduled to be made in early August.
6. Subjective testing conducted of Bremen-4 stem, "as is" and "post washed," directly replacing ES in Marlboro and replacing Bright stem in RL's. Both Bremen-4 variables replacing ES in Marlboro yielded negative subjectives compared to the control, the "as is" contributing a bitter, metallic off-taste and the latter similar character with increased harshness and

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hotness. RLB with post-washed Bremen-4 stem was characterized as more hot, peppery and bitter/green than the "as is" variable both at the 24% level in Marlboro and in 100% RLB cigarettes. Post-washed stem substitution in RLTC, however, was characterized as less hot, peppery, bitter/green and mouthcoating than the "as is" variable at 24% in Marlboro. Further testing in progress to confirm above results as well as to evaluate variables at normal sheet levels in Marlboro.

Exhibit 10-10 and 10-11
Post-washed Bremen-4 stem

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